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BOSTON UNIVERSITY GRADUATE JOURNAL

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The Tenth Voyage

THE New England atmosphere seems to lead, as naturally as breathing, to the use of nautical metaphor. Introducing the *Graduate Journal* in April 1952, Dean Chester M. Alter wrote that "this publication was *launched* with the modest expectation that it will serve as a medium of communication among members of the faculty, the students, and the community." Volume II opened with "a new *rudder*," Dean Duncan Macdonald's subtle reference to his own, then recently developed, relationship to the Graduate School and its *Journal*. The new rudder found himself in a good position to observe "the strong *wake* created by Volume I" and to prophesy that "the *course* is destined to remain even," as it has, by and large, through the first nine annual voyages to this point. By my italics I have stressed their metaphors.

There have been four captains of the good ship *Graduate Journal*: Editors Malcolm E. Agnew, Elizabeth S. Dallas, Frederick M. Link, and James B. Lynch, Jr. To these are due much credit and appreciation for holding successfully to the course originally chartered by Dean Alter. The tenth voyage now begins with both a new captain and a new rudder. Editor Michael W. Alssid has already given evidence of his navigational ability, but the rudder is, alas, of inland wood, less seasoned than previous rudders to the waters of New England's largest university.

The new crew and gear cannot hope to improve upon a sailing plan so comprehensively designed at the start. They can, however, strive to keep the vessel in as good repair as received; to brighten her decks and spars; to seek the most profitable cargo; to engage the most expert deck hands and contributory crew; to trim sails for the most effective progress; and to see that as many passengers are carried and ports visited as may be feasible and consistent with the basic communicational charter.

The owner of the ship continues to be the University and the operator the Graduate School. The horizons of these backers are wide, but wise mariners will choose courses toward the most significant shores. In our wake we may hope to stimulate a phosphorescent light in some

murky depths or to startle occasional stagnant waters. We should not restrict ourselves to sail when more modern steam or nuclear devices may prevent becalming. In an age whose seas are often excessively turbulent, we should not shun adventure while preserving the calm harbors of human knowledge and thought.

Welcome aboard.

RICHARD S. BEAR
Dean of the Graduate School

English Universities—Then and Now*

WARREN O. AULT

William Edwards Huntington Professor of History on the Epsilon Chapter Foundation, Emeritus, Department of History, College of Liberal Arts

EARLY in October of 1907, forty-odd college graduates from all parts of the United States gathered at Green's Hotel in Philadelphia. They were en route to Oxford and they sailed the next day on the 11,000-ton *S. S. Marion*. The voyage lasted thirteen days and the fare, one way, was $42.50. Exactly one-half of those men are alive today.

It was then that my acquaintance with English universities began, and it has continued through several brief stays and a few longer sojourns to the present day. Oxford University was founded 800 years ago, and Cambridge is almost as old, so that the time since 1907 is no long period in their history. Even so there have been physical changes at both universities which can be seen by even the casual tourist. Most of Oxford's academic buildings, now centuries old, were built of soft local stone. The English climate builds character but destroys stone and mortar, and Oxford, of late, has been falling down. A great fund has now been raised and Oxford is getting a shining new face. Visitors may soon see her as she looked when first built. Completely new since my day are two colleges, added to the twenty-six older ones. There is also a "New Bodleian," an extension of the famous Bodleian Library, whose age is half a millennium. The "New" and the "Old" are con-

* The address delivered before the members, initiates, and guests of the Boston University chapter of Phi Beta Kappa, May 12, 1961.

nected by book-stacks beneath the street that separates them, and it is said that in exploring the miles of old stacks, many of them seldom or never visited, the workmen came upon the bones of two assistant librarians!

No face lifting has been necessary at Cambridge—the climate is softer and the stone harder—and no new college has yet been built. But one is about to be launched. The money has all been raised, a site chosen, plans drawn, a warden elected, and the new college has been named "Churchill," after Sir Winston. The grounds cover forty-three acres and the buildings are to be two stories high (no High-Rise there); the whole will accommodate 500 students and will cost $10 million. I have often observed that when the English do anything they are apt to do it right. The Cambridge University library, third largest in the British Empire, had been housed, or stored, for some centuries in half a dozen unsuitable structures, but it now has a home of its own, ample and convenient. It ought to be noted also that Cambridge had to wait for its library even longer than Boston University.

There have been marked changes in educational policy at both of these ancient universities. At Oxford, there used to be an examination in the Holy Scriptures, the Old Testament in English and the New in Greek. Nicknamed "Divvers," and required of all candidates for the bachelor's degree, it was not "the thing" to prepare for this test, but rather to rely on such knowledge of classical Greek as was needed for entrance to the University and such acquaintance with the Scriptures as one might acquire through unavoidable exposure in early years. It was accounted no disgrace to fail a time or two; one heard that even Gladstone had "ploughed." Now all that has gone and Greek is no longer even required for entrance. Latin quickly followed Greek into discard at Cambridge; and now Oxford has just decided that the young man or woman planning a career in science need know no Latin.

Fifty years ago women students at Oxford and Cambridge were entitled only to the crumbs that fell from man's table. One saw them at lectures, sitting apart, but one took no notice of them (or was not supposed to). One heard that there were certain hostels in the city where these strange creatures lived, but no one knew where they were. They were kindly allowed to fulfill all the requirements for a university degree, but not to receive one. Now all restrictions have been swept away. One sees, and hears, the "undergraduettes," as they are called,

everywhere. One barrier remains: the number of women who can be admitted to either Oxford or Cambridge, as yet, is but a fraction of the quota allotted to men.

But developments in the ancient universities have been much exceeded by changes in the modern "red-brick" universities. There were seven of these in 1907, none of them as yet even one century old. Now there are fourteen, and for three more, sites have been chosen and funds partly assured. Some of these, such as London, Manchester, and Birmingham, are well known in the academic world. Many of them inhabit campuses that would excite the envy of any American community. London University, however, by far the largest and also, perhaps, the most outstanding of the new universities, has a "campus" like that of Boston University twenty years ago. London's fourteen undergraduate colleges, four theological schools, and thirteen medical schools are scattered here and there throughout the city. A beginning of integration has been made with the erection of a "skyscraper" on an incomparable site, that is, across the street from the largest library and greatest treasure house in the western world, the British Museum.

Fifty years has brought an increase both in Britain's population and in her university enrollment, but it is a striking fact the percentage of the population with a university education shows no increase whatever. The population of the United States is now 180 million; the enrollment in our senior colleges is 3 million. Thus, 1 in 60 goes to college. The population of Great Britain today is 50 million; the total number of students in its various universities is 85 thousand. Thus, 1 in 600 goes to college. A few years ago I spent several months in the library of the British Museum. At midday I resorted to a quick-lunch restaurant nearby, and more than once I stopped on the threshold thinking I had blundered into a high school cafeteria. The place was crowded with youngsters, all employed in nearby shops. Eighty per cent leave school at age sixteen; 95% at eighteen.

This is, without doubt, the most important contrast between university education there and here: ten times as many of us are exposed to it. One reason for this situation, no doubt, is their lower standard of living, for higher education is expensive. (So is central heating; the English do not really prefer to be that cold.) Furthermore, the English do not believe in higher education for all. In 1944, in the midst of war, Parliament passed a basic Education Act which provided that every

child must have an education in keeping with its aptitude and to the limit of its ability, and that the cost, where necessary, must be borne by the state. This approach sounds fine, but how has it worked? All the children in the state schools take an aptitude test at age eleven. Those of high ability, as indicated by this test, are then allowed to go to a grammar school which is the pathway to the university; all the others go to another type of school which cannot lead to a university. The talented few are then endowed with scholarship aid which, if they are sufficiently brilliant, will see them through the university. As a result, a great social change has taken place, especially at Oxford and Cambridge. Mere wealth no longer guarantees admission, but genuine talent at any level of society will get a student there. University dons remark that the undergraduate body is now much more serious-minded, more intent on a high academic rating, and they are not altogether sure that this is a good thing.

Another important factor in limiting enrollment in English universities is family attitude. A few years ago, while the postwar economic crisis was at its height in Great Britain and the slogan "export or die" was current, several British industries sent to the United States committees, half-labor and half-management, to find out why we outproduced them. For example, one American steelworker, they discovered, produced 50–90% more in a given period than a British steelworker. The fundamental reason, they reported, was not that our industries were more highly mechanized. There was a psychological cause: "American society believes that every one must constantly be trying to better himself," they reported; "the whole American way of life is a challenge to the individual to do his best." British workers as a class are not concerned that their children shall rise above the circumstances of their parents. With the arrival of the welfare state, the conditions of the working class are the best they have ever been. Social security benefits are so substantial that the nightmare fear of unemployment has receded. Why should a working-class boy "stuff 'is 'ed with a lot of nonsense" in college? With us, higher education is wellnigh the creed of the nation; in Britain it is not.

University education in England is still, in the main, nonprofessional. The British believe that higher education is not a tool, but a hand that can handle any tool. After taking a bachelor's degree, if the graduate takes up a job, he learns as he earns. Or if he decides to enter

a profession, such as teaching, law, or medicine, he goes to a special school, which, however excellent, does not as a rule grant degrees. Thus the British educators look with respectful amazement (to quote a recent comment) at certain "eccentric practices" of American universities "like giving degrees in physical education to students who squeeze through college on the strength of their proficiency at basketball." This preoccupation with the liberal studies in English universities has had some results that are not altogether fortunate. Such an education does not appeal to the working class, as we have seen. Thus, a university degree is something of a status symbol. University graduates, "U," that is, are distinguished from "non-U" by their mode of speech, for example; a provincial vocabulary and accent are the sure signs of the uneducated person. Social classes still persist in England, and the educational system tends to perpetuate them.

Indeed, an instinct of deference still persists in the English masses. They love their lords and ladies and follow their lives with eager interest and close attention. "We dethroned them as tyrants and preserved them as pets," an English don once remarked. This deference is extended, as well, to the educated class. British voters have never looked askance, still less feared, a "brains trust" in government. In fact, there are so many high-class intellectuals (we would call them Phi Beta Kappas) in the higher echelons of the government that it has been said that a dozen university faculties could be drawn from the British Civil Service. It is interesting to note that the leader of each of the three political parties, Macmillan, Gaitskell, and Grimond, took a "First" at Oxford; or, as we would say, "they graduated *summa cum laude.*"

We believe in education in breadth, at the university level. "Both for self-development and social usefulness," we say, "every student requires a measure of understanding in three great fields of knowledge," literature and the arts, natural sciences and mathematics, and the social studies. Whether our approach be integrative or distributive, this program constitutes approximately half of a college career. The other half is earmarked for a field of concentration, but even in it the student will find a considerable area of "related subjects," as we call them. At an English university, undergraduates begin to specialize immediately; indeed, they have already had a year or two of work in their field in a secondary school. Consider two examples taken from the Oxford curriculum. In the Division of Modern Languages seven

languages are listed, of which the candidate for an A.B. chooses one. In this he is expected to show in the final examinations for his degree "a competent knowledge of [certain specific] periods of the language, its relation to those languages or dialects with which it is etymologically connected, the history of its literature; so much of the thought and history of the country as is necessary for the understanding of the literature; and certain prescribed authors or portions of authors as examples of literature and in their relation to the history and thought of the period to which they belong." To this requirement is added a competent knowledge of the chosen language as it is spoken and written at the present time, tested by oral examination and written composition. It ought to be noted that no provision is made for elementary instruction in foreign language at the university level since all that is relegated to the lower schools. In the Division of Natural Science, to choose another example, eight sciences are listed. The candidate selects one. The final examination consists of "written examinations of five papers of three hours each and two practical examinations of six hours each. Candidates must also have a sufficient knowledge of mathematics and of German." The level of achievement required to rank well in the final examinations for A.B. is very high. Vacations as well as term-times are set aside for study, and nobody works his way through. The English A.B. may not have much breadth, but it has a good deal of depth, and I believe that there is some justification for their view that depth gives breadth.

And so the serious student who goes out into life with a bachelor's degree from an English university will have acquired such a thorough knowledge of a subject that it may well become a lifelong interest—an observation which will, in some measure, account for the large number of educated Englishmen who have what I may call "intellectual hobbies" to the pursuit of which they devote the largest part of their leisure time, whatever their work may be. One of the undergraduates of my day, specializing in Oriental studies, did well in his finals and, entering the civil service, was assigned to the Colonial Office. In his leisure time, for some years, he wrote learned articles in the field of Oriental studies. When the chair of Oriental Languages and Literature at Edinburgh became vacant, he was chosen for the post. And what does he do now with his spare time? The card catalog of our library lists volumes on the affairs of the British Dominions, their au-

thor A. B. Keith, Professor of Oriental Languages and Literature at the University of Edinburgh.

Without doubt, the greatest difference between "then" and "now" in English universities is that today they are financed in large part by the government. A staggering increase in the cost of higher education manifested itself in England before it did here, and just after World War I—that is, in 1919—the government began subsidizing the universities, not by way of sponsored research or low-cost loans for dormitories and commons, but by a lump sum for current expenses. In 1919, the total sum paid out to all the universities was £1 million per annum. Today it is £40 million, which is 70% of their budget. Another £20 million a year, on the average, goes for new buildings and equipment. Government grants are based on the recommendations of a University Grants Committee, made up of men of high rank in university and public life. So great is the prestige of this Committee that the participating institutions accept their allotments without grumbling. At least that is what one of the members of the Committee told me, and I could but marvel at the altruism, or self-control which faculty members possess, or appear to possess, in England. Imagine the academic ruckus that would ensue when the findings of such a committee were made known in this country.

Still more wonderful, perhaps, is that the distribution of this largess on the part of the government has not been followed, as yet, by any attempts on its part to influence academic policy. England's universities are not "state" universities. They are all independent and self-governing, free from any form of government control. The Boards of Trustees include not only men of business and affairs but a large proportion of faculty members. Evidently, the English believe that higher education is too serious a matter to be left to businessmen. At the head of each university is a Chancellor: Churchill (Bristol), Macmillan (Oxford), Eden (Birmingham), the Queen Mother (London), Princess Margaret (N. Staffs), the Princess Royal (Leeds), and the Duke of this and the Duchess of that, of the others. The functions of these Chancellors are largely ceremonial, but such is their influence that they can be relied on to frighten away would-be meddlers in university policy. The working head of an English university is a member of the university's faculty. In England, faculty control of academic policy is taken for granted.

It has been said that English universities have "little system and no method," that they assume that a student can learn only through the "active operation of his own intellect." Stephen Leacock visited Oxford to find out, as he said, why one usually finds an Oxford man at the top of the tree. So far as he could discover, he reported, the Oxford "system" consisted of spending four years sleeping in a tangle of ivy and being smoked at by a tutor; this turned the student into a ripe scholar. The English universities supply laboratories, libraries, lectures by top-flight scholars, and a modicum of guidance, but there is no compulsion to make much, if any, use of all of these. They are but means to an end, namely, to enable the student to prepare for the final examinations in his field. Individual students react to this system in various ways; some (though not so many as in my day) waste their time and that of their expensive tutors. Others, fired by unquenchable zeal, make the utmost use of their opportunities.

This academic laissez faire may also be seen in a university's treatment of its professors. Once installed in his chair, the professor can fulfill the stated requirements, in many cases, by giving a single course of lectures and supervising a few students. What else he does is his own choice; it is assumed that he will know better than any one else (a dean or department chairman, for example) what he is best fitted to do for his university. Actually, English professors work very hard. Their comparative freedom from academic routine enables them to win international fame in their profession and, in many cases, to become leading figures in the world of affairs outside the university. One of my friends, an Oxford don, failed to find suitable housing in the city of Oxford and inquired whether, by the terms of his appointment, he need dwell in the neighborhood. "You can live on the Riviera if you like," he was told. Actually, he lives at his home town, four hours from Oxford by train. On Tuesday mornings he travels to Oxford and on Thursdays he returns home, having fulfilled his assigned duties. Meanwhile a stream of books and articles flows from his pen, to the enhancement of his university's prestige, as well as to the extension of knowledge.

We look at others, sometimes, in order that we may the better understand ourselves. What kind of a job are our own universities doing? Quantitatively, we far exceed the English, as I have shown. There are those who deplore this situation; too many students are mere seat-

warmers, they say, and the bachelor's degree means less and less to more and more. Others hold that an even larger percentage of our young folk should enter college. The democratic principle requires it, and public assistance must be provided where needed. I agree. The most important product of a university is not academicians, dedicated to the life of a scholar, but men and women qualified to play very varied roles in the life of the nation and the world. Four years of college (or even two) can enlarge their sympathies, raise their standard of values, broaden their tolerance, and train them in self-reliant discrimination and reflection. This is the sort of education which remains in the spirit after one has forgotten all he learned, and we need much more of it.

Where we fall behind, however, is in the education of the top 10%. Forty-five out of a hundred boys and 60% of the girls of highest intellectual ability in this country do not get a college education, a total of over 100,000 a year. And still more damaging is our failure to provide adequately for the top-flight students who do enter our institutions of higher learning. It is here that English universities excel. We have borrowed from them the Honors Program, the Comprehensive Examination, and even, here and there, the tutorial procedure, but only in a watered-down version and in an apologetic, halfhearted way. Our democratic ideal prevents us from setting one element of the student body apart as an elite. The only kind of an elite we tolerate is the athelite. Outstanding intelligence demands special and expensive training no less than exceptional physical strength and skill; even more, for the nation without a trained intelligence, in these times, is doomed.

What is urgently required in our universities, I believe, is the deliberate and forthright provision of special facilities for the specially qualified. Such facilities will scarcely be possible, however, without a change in the public attitude, for the term "egghead," thus far, is one of distrust, derision, even contempt. But there has been of late a "wind of change" in high places. Academicians abound in the nation's capital. Members of Congress who have Phi Beta Kappa keys now wear them. Eventually, no doubt, we shall decide that a few professors would not be out of place on a university Board of Trustees.

Our Eye and Our Horizon: A Profile of Boston University for the 1960s*

LEWIS H. ROHRBAUGH

Vice-President for Academic Affairs, Boston University

IT was Emerson who remarked, "It is the eye which makes the horizon," and I have chosen this phrase upon which to base my remarks because these remarks are addressed to the University's future and because I am convinced that the University's eye will make its horizon. In other words, Boston University will become what we are agreed and determined it shall become. I know that with my statement of goals and of further steps towards them not all will agree. That is to the good. Agreement too often can spell lethargy and complacence. Disagreement, or controversy, at least means a dynamic situation and at the most, when fair-minded and objective persons are involved, can result in dynamic, constructive action. Before looking into the future, however, it is fitting to judge how well our present position meets the ideals of a great university as the Founders envisioned them.

For this kind of judgment, how useful it would be if we had an educational long focal-length wide-angle camera such as the one used for other purposes by the unfortunate U-2 airplane. That U-2 camera, incidentally, was developed initially under a postwar Boston University optical research program under contract with the Air Force. The aim was to produce an aerial camera large enough to have a wide field and yet to avoid the defect of all such cameras whose photographs were in clear focus only in the center of the film. But lacking a device of comparable breadth and depth, I can assess how far and how well we, in 1961, are warranted in feeling that we have implemented our Founders' mandates, in this brief space, only by selected educational flashbacks.

First, on institutional structure, our forebears wrote that "Boston University ought neither to generalize education merely, nor to specialize it merely, but do both at one and the same time." Their plan of organization was to have colleges which would prepare students for the "higher industries and arts of civilization and for the study of the

* The text of the Boston University Founders' Day Convocation Address, delivered March 13, 1961.

professions"; professional schools which would qualify students theoretically and practically for professional life; and a graduate school—in those days called a school of all sciences—which would focus on the universal or nonprofessional aspects of postgraduate studies. From the beginning, this structural pattern was carried out faithfully. In 1878, Boston University was the only United States university to offer theology, law, and medical students graded uniform courses covering three scholastic years and requiring for graduation three full years of study. Even the adequacy of this time period worried the Founders, and in the following year they added another year's study to the period required for a medical degree. Their insistence upon appropriate division of educational programs into separate schools within the framework of the university, and their emphasis upon the need to carry "the general education of each pupil as high as possible before giving him the special," was a pioneering step, and this basic institutional pattern, by and large, came to be followed in most American universities.

The Founders' second objective was that Boston University become an institution of many schools and colleges, and of many students. That objective has been reached; fourteen schools and colleges and numerous other institutions and bureaus and centers, 11,000 full-time and over 20,000 part-time students, and an annual budget above $20 million—surely these facts prove the achievement of this objective. May I say, parenthetically, that it is no secret that the President and I, particularly at budget-making time, not infrequently are afflicted with an old-lady-in-the-shoe feeling. And remember, if you please, that one out of every three New England schoolteachers has studied at Boston University, that similar proportions of this region's doctors and nurses and lawyers and business chiefs have sat in one of its classrooms. This University's contribution? About its dimensions there is no question.

The Founders also laid great stress on standards of excellence. Consider their ideas on admission requirements. I reckon that few entering freshmen today could have qualified in those early years, and I know that the Vice-President for Academic Affairs would have been denied admission. Indeed, these requirements must seem ludicrous, or frightening, to us. What did they, and what do we, ask a student to show that he is ready for college work? The requirements then included sight translation of Caesar's first four Gallic War books and

Cicero's *Orations*; from the Greek the first three books of Homer's *Iliad* and four books of Xenophon's *Anabasis*; and translations also from English into Latin. I am not sure that we in higher education today, relying increasingly on the intellectual thermometer of test scores, know any more about potential than in those early days. I do not mean to denigrate testing. I do object to overreliance on quantification, on numerical comparisons and competitions, and on the resultant tendency, whether in grades, athletic contests, bathtubs, or sputniks, to overstress quantity and the "more-than" factor.

The Founders' fourth principle was that of "Proposing the impartial advantage of every class, nationality, and sex." From the outset they made clear their conviction, a lonely one then, that women could and should be educated. And they acted on this conviction. Boston University was the first institution in the world to open the entire circle of postgraduate schools to women, and, I believe, the first to award the doctorate degree to a woman, Helen Magill, who, in 1877, received the PH.D. degree in Classics and whose dissertation was entitled "The Greek Drama." The general principle of nondiscrimination has also been zealously maintained. Consider, for instance, our nine hundred students from eighty foreign countries, and witness the President's visit last year to Africa where, in every country to which his itinerary took him, he found Boston University graduates in strategic and developmental posts. We all know how broadly our student body is representative of all faiths. To me, the best recent illustration of the way in which the University carried forward the flag first raised by the Founders is the spontaneous faculty-student movement last year to bring to our classrooms qualified Negro students who, because of participation in the sit-in demonstrations in the South, were expelled from their colleges.

Another early injunction was that the University shall not fail to experiment, to explore new and promising ventures in education. The University has never hesitated to explore, to extend, and sometimes even to overextend. The record, on the whole, has been distinguished. Certainly, it has been lively. In those early days it was characterized by agreements with the Universities of Athens and Rome under which our graduate students could take work in those institutions toward Boston University degrees. The tide of pioneering still runs strong today. Reference to our internationally-known African Studies Cen-

ter, to our two-year-old Law-Medicine Research Institute, and to our new and nationally-known six-year liberal arts-medical education program, begun this fall, alone illustrates the fact that we are still pioneering.

The last flashback and current assessment which I should like to consider has to do with liberal education. Today, of course, liberal arts education is a stock-in-trade for most colleges. But liberal education has had a cyclical history, and in many a college its emphasis now has a Johnny-come-lately look. It is the more remarkable, then, that our Founders were so firmly convinced of the need of liberal education. To cite from the first annual report of the University: "All persons proposing to study law (and other programs) are earnestly recommended to first complete a course of liberal studies in some college." Here, the record has been consistently a distinguished one, and today, for that kind of emphasis, the University has no peer among the larger American universities. All in all, we may feel fairly well satisfied with the extent to which the principles set forth by the Founders have been carried out. But enough of the past. Let us address ourselves to the future.

The problems of higher education are rapidly taking on dimensions and intensities unthinkable even a generation ago. That we, as Americans, have the resources and abilities to solve these problems effectively, there can be no slightest doubt. And yet, although by nature an optimist, I should be less than candid were I not to view the future mission of the private, independent institution in general, and of our University in particular, without deep concern. The goals of higher education do not concern me; here there really is little controversy. We all want to develop in the individual, creativity which is at once questioning and responsible. My concerns can be put more specifically. To a degree, they represent the case history and prognosis of any privately-supported independent university with inadequate endowment. But many aspects are unique to Boston University. As in looking at the past and present, in my comments on our future mission I shall select specific issues and highlights which appear to me to have great portent.

Our major need is to place in agreed and always clear focus the over-all concept of the institution we are determined that Boston University shall be. To my mind, this concept is abundantly clear and

wholly in keeping with the Founders' objectives. Ours must continue to be an *urban* institution, in an *urban* setting—an institution with always increasing standards of excellence, oriented especially to the educational needs of the New England region from where 76% of our undergraduates now come, with an extensive residential student body, but with a larger complement of commuting students. Ours must continue to be an institution which places the greatest emphasis on meeting the educational needs of those whose families are at neither end of the economic scale and who themselves, potentially and by and large, fall into the center of the bell curve into which too many of us mentally cast all students. This idea of the University means many things. It means a pride in the label "streetcar university." It means that we hold, as peculiarly applicable to our institution, Henry Heald's definition of a city university as "one of the few immoveable islands in a sea of urban change." It means that we need to accept and rejoice in urbanization in order to exploit to the fullest the advantages and unique offerings of a city setting, of this City of Boston. Accept that assumption, and what may we then infer?

First, we must banish any lingering thoughts that a campus demands pfeitzer junipers and water fountains and rolling greensward. We must resist what Henry Steele Commager calls the inclination to fix the pastoral image of the American college, as versus its European antecedents and contemporaries, as a place where young men and women saunter over sweeping lawns or study in pennant-arranged rooms. This is a persuasive stereotype. I can well remember when, year by year, the debate raged at my own University of Pennsylvania on the pros and cons of a move to Valley Forge. But Boston University cannot return to the institutional pattern of nineteenth-century America, and if it tried to, it would be opposing all modern American trends, with urbanization the order of the day. Ours is, and will be, and should be, an urban university. The fundamental decision taken on capital plant in the fall of 1959, to have a high-rise campus, to build "up" instead of "out," has basic implications which we must follow through, in all directions.

We believe that education is learning how to use knowledge. We realize that learning does not stop outside the classroom door but encompasses the whole campus experience. And if we want to have students under the influence of a family of scholars, we must direct atten-

tion to conditions that produce and nurture such a family. To this end we must avoid, as someone has said, turning a community of scholars into a collection of commuting scholars. For a substantial proportion of our faculty, we need to provide adequate housing on or near the campus. Yet faculty concerns have other facets—none more important than salary. Despite significant improvements in the past five years, this University, like most other universities, must make more progress, because college teachers and staff are not only underpaid in contrast to many other professions and occupations, but they have lost ground in terms of real income as prices have continued to spiral. This problem affects urban institutions perhaps more than others. One of the alternatives to which some teachers have been forced to turn, "academic moonlighting," can be lessened only as higher salaries are provided. Faculties are the greatest resource and the most sensitive factors in university development. They are the university. The university, Boston University, must attract and retain able men and women to help it meet its future, and only adequate salaries will achieve this.

The University needs to do much more, together with other institutions and agencies, in the regeneration of the city and of the region. It needs to do things which point not only to the workshop role the city serves, but also to the improvement of a cultural and intellectual center in which an academic community can flourish. It needs to avoid academic insulation and isolation. Unquestionably, Boston University, both on the Charles River and Medical campuses, could do more, in company with other institutions and agencies, on urban renewal and general urban regeneration. Thus viewed as an urban center of leadership, the University needs to rise above local prejudices and political fragmentations. It needs to set standards, to be a constructive critic, to speak out boldly on matters of principle. It needs to make more contributions such as that of Professor Levin's publication on the alienated voter. It needs to get its roots down further and its branches out. It is part of the city and region and not just by happenstance housed here.

We must consider another question looking for an answer. How many students should Boston University have? Even before that, we must consider how many we could have, and how many we can effectively accommodate. And well ahead of either of these, we must place the absolute imperative that, before any major increase, we must use

more effectively, and where they count, the resources that we already have, strengthening and giving better support to our present programs. A study made last winter, a study involving only the six New England states, indicates that, if the ratio of college-age young people coming to the University were to continue at the same rate, our full-time student body would, by 1965, increase 30% from today's 11,000 to some 14,000. By 1970, it would increase by 50% to some 16,000. Should we accommodate these additional students? I think our only answer must be an unqualified yes. But to make it, we must assume that we have the facilities, the physical plant, and the operating funds to do the job.

Another study made in December of 1960 asked this question: given adequate faculty and operating funds, how many students could the University accommodate in its present or firmly planned facilities —including the first of the new high-rise buildings and the new biological and physical science facilities across Commonwealth Avenue? The study gave this answer. We could, on these bases, accommodate altogether only 1,500 to 3,000 additional students—and with this important qualification, that *where* we can accommodate them, in our present organizational pattern, might not correspond to the schools where they would enroll. Yet if we assume that, as part of our social responsibility, we should attempt to accommodate larger numbers, provided we secure adequate resources first to strengthen properly our present programs and then to meet expanding needs, we face the Scylla and Charybdis confronting most other institutions, particularly private ones. Someone has said that this means there is a ditch on both sides of our road. How to keep out of these ditches and yet move forward successfully requires that we take stock of our resources, estimate closely what will be needed to arrive at our objectives, recognize what gaps exist, and then close the gaps. As Alfred North Whitehead aptly observed, "Where attainable knowledge could have changed the issue, ignorance has the guilt of vice."

Observe the comparable national picture of higher education. It is reckoned generally that the 3.6 million students in higher education today will double by 1970 and that the $3 billion spent annually today on higher education will expand three or four times by 1970 to an annual $11 billion. Taking publicly and privately supported institutions together, this means that, for the nation to meet an $11 billion bill,

22% ($2.4 billion) of income would need to come from tuition; 14% ($1.6) from endowment, gifts, contracts, and grants; and 8% ($.9) from auxiliaries (dormitories, food service, and so on), leaving still an unmet gap of 52% ($6.1 billion). How does this pattern of national income compare to Boston University's? Although the correlation is not necessarily close, because the estimates I have cited cover both private and public schools, the major difference is in the part tuition plays. Last year, tuition at Boston University already represented 60.2% of income, whereas, nationally, tuition income constituted 22% of the income of public and private institutions together and 33% of the income of private institutions alone. The gap between the prospective dollar resources and costs gives us a warning loud and clear.

What implications has this prognosis for us? It means for us, as for every private and, for that matter, every public institution, that we must *first* examine and then strengthen our own institutional resources. Testing the adequacy of our institutional framework, we must make sure that we are using present resources where they are needed most and count most. Yet even when all this has been done, when we see more of the vigorous critical examination of needs and resources now in progress and when we mark our gaps and plan ways of closing them, even then, I am reluctantly sure that we shall have to conclude that, between income and outgo, there will yet remain a gap which, from presently foreseeable resources, we cannot hope to close.

Higher tuition? Yes, tuition at Boston University will certainly go higher. But how much higher? And do we want the change in University personality which "too far up" could bring? An example of the kind of change I mean can be seen in medical education. The abnormally high costs of a medical education, according to our Medical Dean, have lessened the number of applicants, decreased their ability, and, in the end, have meant that 40% of them come from the 8% of the nation's families earning above $10,000 annually. Do we want this kind of change to occur in the University personality generally?

The prospect is a gloomy one. Indeed, in looking in the same vein at many a private college, I have to marvel at how, year by year, they have recently been able fiscally to defy the law of gravity. Many private colleges certainly will not be able to defy fiscal gravity much longer. The only answer (and I point out again that this is in addition to the University's having studied critically and acted appropriately on the

need for optimum use of present resources) is to look to the American people to come to the conclusion that, having used pennies where dollars are needed, we can afford to and will spend more on higher education, all higher education. The 1% of gross national product spent at present on higher education is mute testimony. It may ultimately come to deciding whether to spend on higher education, the medium of our survival, or on other things.

Even if we were able to expand our current income sources—tuition, alumni and graduate aid, the gifts of philanthropic foundations and of business and industry—we still have to be supported by public funds. And this is not our problem only. Our sister institution across the Charles, one of the most heavily endowed and having but last year completed successfully a campaign for $82.5 million, has already reached this same conclusion about its own future. But if substantial support were to go to privately supported institutions, why not convert all of them to public institutions? Because the strength of American higher education stems from the coexistence of strong public and strong private institutions. Privately supported colleges and universities enroll about 45% of the students, and they will continue to provide the kind of education and the educational flexibility which have marked their history. Would public support not introduce a new element into privately supported institutions? Not at all, if the forms of support were wisely wrought. There is now no publicly supported institution which does not get aid from private sources. And there is no privately supported university which gets no public support, both direct and indirect. No institution is strictly private. None is strictly public.

Every university, then, public and private, will find that between its present and foreseeable resources and the need society expects it to meet, there will be a gap of monumental dimensions. With Boston University as our case in point, the dilemmas we face are grave indeed. The steps to meet the chosen solutions are absolute imperatives, it seems to me. Some of these steps are internal in nature and under our direct control. They include, first, the need to retrench, reasonably, critically to assess those activities not constituting a significant part of the educational program or of its support and servicing. They include the need to examine and, where possible, to improve the use of faculty and staff and of present time and space arrangements. But even with

optimum progress in this direction, our commitment to capital plant now and to come, and our rising operating costs, will make of these efforts only a shoring-up process. We must look for substantial aid elsewhere.

Efforts must be reinforced to make clear the case for more alumni support. We have a right to expect that business and industrial support will rise far above the 1% of income before taxes which it now approximates, particularly with the broad tax provisions on this score. We have a right also to expect that the tax-exempt foundations, whose grants to universities have meant so much, will swing gradually to a rhythm of general institutional support to be expended in ways judged best by the institutions, and away from grants for projects which the foundations prefer to have explored and implemented. But most of all, we need to look to public sources for massive help in meeting the gap between income and outgo. In the public domain there are three logical sources—the City, the State, and the Federal government. There are many compelling reasons for such contributions coming from the City of Boston. They range all the way from the interest of society to the services which we render to the City—the vast medical services provided in the South End by the Home Care of our School of Medicine, for instance. Nonetheless, realistically, I cannot envision in the years immediately ahead, when we shall need it most, any prospect of direct financial support from the City.

State aid, however, is quite a different matter. We have a right, all of us as taxpayers, to expect the Commonwealth of Massachusetts and the other five New England states first to make the higher education dollar stretch as far as possible and, at the same time, to multiply it. This means, for example, that jointly, through our New England Board of Higher Education, a more searching look ought to be taken at what we do now, what we might do differently through our public institutions. In the most heavily and increasingly more industrialized and urbanized region in the nation, do we still require six agricultural colleges, for example? And beyond the optimum use of present State institutions and dollars, it is no new thing to conceive of the State as a contributor to the support of private institutions functioning clearly in the public interest. Since 1785, my own alma mater, the University of Pennsylvania, has received aid annually from the State, with no trace ever of interference with University policy. There is another less

direct form of State support which, accepting the premise of a private institution in the public service, to my mind is logical. It is that of tuition aid, paid directly by the State to students admitted to college and with the student entering the college of his own choice. This would not be an innovation. And it would be on the basis of the well-being of society, both in terms of helping to provide the personnel needs of our modern society and of the fact that the added tax return to the State from these young people would more than meet the added costs of their education.

But most of all, it is to our Federal government that we must look for help to close the gap. First, the Federal government can help by correcting the free-loading in which it now indulges at the expense of the universities. Examples are numerous. ROTC programs, conducted in co-operation with the armed forces, have for years represented another plate at the table for which costs exceed the board bill. And this year's laudable trend to substitute university-taught for ROTC-taught courses lightens further the government load by transferring it to the universities. So also with many programs in which, to strengthen secondary education rather than higher education, universities including our own participate under the National Defense Education Act. A third well-known illustration is the Federal contracts and grants research, representing, in so many instances, services purchased for which the government should bear the total costs. Yet over and above these awkward situations is the urgent need for massive aid to higher education on the simple but fundamental ground that higher education is in the national interest, is, indeed, the main medium for the survival of our American and western civilization. The variety of forms of assistance are many. I am highly in favor of the recent higher education proposals of the Federal administration, modest and overcautious and conservative as they are. Especially significant for institutions such as ours are the programs of long-term, low-interest loans for the construction or renovation of academic facilities, and the extension and supplementation, with operating grants to the institutions, of Federal scholarship programs. And essential, of course, is the discontinuance of the inappropriate and unnecessary disclaimer affidavit. It is likely, then, that the Federal government will serve as the chief source of the public costs of higher education. There is every reason for State and local government bearing significant fiscal responsibilities also.

These various observations have had many implications for the future of Boston University. The options are at hand. "Babylon had its opportunity and built the Tower of Babel. The University of Paris had its opportunity and in many ways set the thinking of the Middle Ages. American higher education has its opportunity at a most critical time in the history of civilization." And Boston University has its share of this opportunity and challenge. For over ninety years, it has met challenges thoughtfully and successfully. The years immediately ahead hold crossroads more significant than any the University has faced. It is *our* eye which will make *our* horizon.

Preparation of Graduate Students for College Teaching in the Biological Sciences

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THE preparation of college professors is the traditional role of the graduate school in the American educational system. In an analysis of a self-study of the Graduate Faculty of Boston University, Dean Millard has reported that the Graduate School is still primarily concerned with the preparation of teachers, especially for work in higher education. In this way, the Graduate School is responsible for the preparation of college and university professors much as the School of Education has functioned in this capacity for teachers preparing for a career in secondary schools. Consequently, it is important to examine the type of graduate training provided in light of the objective of college teaching and to initiate new and imaginative ways of achieving this objective in proportion to ingenuity and opportunity. The urgent need for graduate schools to provide special training in the teaching of science, particularly at the college level, has been sounded by lead-

ing educators.[1] In this article, we wish to discuss several attempts to improve the preparation of doctoral candidates in the biological sciences with respect to this special problem of training for college teaching.

Importance of Laboratory Assisting and Fellowship Opportunities

Participation by both graduate and undergraduate students in the teaching program of the Biology Department has been our most effective way of recruiting potential teachers. In effect, our experience clearly substantiates the importance of the "scholar-teacher attitude" in the undergraduate curriculum as discussed by Professor Leisher.[2] At the undergraduate level, academically promising sophomores and juniors have acquired an urge for a career in the teaching of biology as a consequence of their enthusiastic experiences in the role of Undergraduate Assistants in Biology. This appointment offers them the opportunity to teach in the laboratory under the direct supervision of a graduate student working as a Teaching Fellow. At the graduate level, the responsibilities associated with the Teaching Fellowship provide a satisfying challenge which continues to motivate the student in the direction of teaching, particularly in the college or university.

The need for increased numbers of fellowships, with better stipends, is obvious in view of the high cost of graduate education to the student and the practical aspects of competition among graduate schools. However, the motivating aspect of the teaching fellowship is perhaps the most convincing argument, at least academically speaking, in favor of the expansion of this program.

Role of Research Opportunities

In colleges and especially in universities, biologists must combine, in varying degrees, research with their teaching. Personal satisfaction and professional stature can be achieved only by maintaining a dynamic equilibrium between both research and teaching. Furthermore, a measure of administrative participation comes more or less insidiously into the life of the majority of university-employed biologists. Expo-

[1] See Warren O. Ault, "The Graduate School and Research," *Graduate Journal*, VII (1959), 91–94.

[2] John F. Leisher, "The Responsibility of the Graduate School for the Training of Teachers," *Graduate Journal*, VII (1959), 86–90. For a general statement on training for teaching careers at the college level in the graduate school, see Bernard Berelson, *Graduate Education in the United States* (New York, 1960), pp. 64–69.

sure to biological research combined with the thrill of self-discovery is, no doubt, the second most effective factor in attracting students to graduate work in the biological sciences and thus indirectly to careers in university teaching which provide opportunities for combining basic research and teaching.

Our undergraduate Honors Program, Problems Course, Undergraduate Seminar, Bios Club, and especially the National Science Foundation sponsored Undergraduate Research Participation Program represent significant devices which contribute substantially to the recruitment of future biology teachers and to their basic preparation for college teaching.

During the past three years, the training grant from the National Science Foundation has enabled us to offer stipends and research support to some twenty-seven outstanding undergraduates for participation and training in departmental research programs. Juniors, seniors, and occasionally sophomores are selected by the staff on a competitive basis to work side by side with participating professors. By mutual selection, each professor undertakes the training of one student, insuring the closest possible personal and academic association. During the course of the program, the Director, Dr. Slechta, holds periodic round-table discussions with all of the participants. These discussions center about specific problems faced by individual students in the course of their research. The participants are also invited to attend departmental colloquia which are usually restricted to senior undergraduates. The program runs full time for ten weeks during the summer and continues part time through the academic year. During the academic year, the student has the rather unique opportunity of keeping a hand in research while carrying his usual course load. The program of the undergraduate research participant is thus, more or less, the equivalent to that of the graduate student, and in many cases this is also true of the participant's capacity for independent study.

In general, the program has been highly successful in providing much needed informal training for superior undergraduates, a point evidenced by the enthusiasm and devotion shown by the students for their work, their high motivation to go on to graduate school to prepare for careers in teaching and research, and the unanimous endorsement of the program by the faculty members of the department.

A number of graduate students in the Biology Department have

been awarded National Science Foundation Co-operative Fellowships and National Institutes of Health Predoctoral Fellowships during the past several years. While these awards are providing for the support of students engaged in formal course and research work, we believe that, in most cases, training in teaching should also be included in the graduate program. Therefore, a small number of hours of teaching, usually six per year, are required of fellowship holders.

Predoctoral Internship in Biology

Although considerable training in teaching is offered at present by our teaching assistantship and fellowship programs, we believe that an organized course listed annually in the catalog would focus the attention and efforts of our staff specifically on this type of training and will also attract graduate students who may not be holding assistantships or who may have assistantships requiring no teaching duties (e.g., research assistantships). In lieu of a stipend, we allow academic credit for this work, a procedure which provides a "certificate" of accomplishment in the form of a grade on the student's record. The purpose of the course is to give before-the-job training in the teaching of biology at the university level. We want to develop a professor-graduate student relationship in the art of teaching comparable to that which has been traditional in research.

The administrative aspects of the course are co-ordinated by the Department Chairman, who assigns each intern to one faculty member for close supervision and active participation in the teaching activities of that faculty member. The course in General Biology, with its excellent opportunities for leadership in recitation and discussion work and for responsibility in laboratory work, is absorbing many of the interns. Two briefing and planning periods are conducted every week for staff personnel in General Biology. However, the opportunity exists for interns to be assigned to advanced courses such as Comparative Anatomy, Physiology, or Microbiology. Students permitted to take this course are selected carefully with the interest and need of the student in mind. It is not the purpose of the Internship Program to provide labor to fill in gaps in our laboratory teaching schedule, much as this may be needed.

Although specific aspects of the indoctrination will vary with individual staff members depending, in part, on the field of specialization,

certain basic experiences are provided for the interns taking the course:

a. Opportunities to prepare and deliver a few lectures under close supervision.
b. Participation in the preparation and grading of examinations.
c. Participation in the analysis of class work for an entire semester and in the formulation of final grades.
d. Advising and student conferences.
e. Organization and direction of laboratory work.
f. Sharing of problems relating to the scheduling of students, assignment of assistants, procurement of supplies, conduction of demonstrations, motivation of students, and others.
g. Selection and utilization of teaching aids.
h. Introduction to sources of materials for teaching (library resources, museum materials, herbaria, greenhouses, field collecting, and so forth).
i. Insight into scholarly pursuits allied with teaching at the university level, such as research work, membership in biological societies, and participation in programs of biological societies.
j. Exposure to administrative work associated with college teaching.

The practical value of the Predoctoral Internship in Biology cannot be judged at this time. The course was introduced in 1959–60 and only four students have participated to date. We believe, however, in the potentiality of the program as a means of improving the preparation of graduate students for college teaching.

The Seminar Program

Two formal seminar courses are given by the Biology Department. Attendance in the undergraduate course is limited to seniors of high academic standing. All PH.D. candidates are required to take the graduate course, and A.M. candidates are encouraged to attend. Both of these courses are designed to acquaint students with biological literature, to give them practice in the use of the library, and to afford them an opportunity to present orally, before the class, reviews of current scientific papers. There can be no question of the value of these aims for future teachers of biology.

In addition to these formal seminars, staff members are encouraged to hold informal sessions with their students. There is no set format

for these meetings (frequently held while having lunch) in which students and teachers discuss informally any aspects of teaching or research that might interest them. The value of such discussions depends, of course, on the effectiveness with which the teacher stimulates the student, and the example of an enthusiastic instructor can help to mold the future teacher.

The graduate colloquium is yet another means of acquainting future biologists firsthand with current research. Speakers may be fellow graduate students well along in their research, staff members from our own Biology Department, or biologists from other institutions. The formal presentation of a paper is followed by a question period in which students may ask the speaker to elaborate on specific points. Since the colloquium is intended to be a broadening experience, speakers are chosen from several areas of biological research. These graduate colloquia are held once or twice a month and graduate students are required to attend.

Role of Field Work

Since Boston University is an urban school, field training in biology must be carried on at some distance from the campus. Despite this handicap, however, the Biology Department does not believe that this aspect of biological education should be neglected. Staff members conduct field trips in connection with such courses as Forest Ecology, Invertebrate Biology, Entomology, Vertebrate Zoology, Ichthyology, Ornithology, and Mammalogy. Students who take these courses travel to areas all over Eastern Massachusetts to observe plants and animals in their natural environments and to learn collecting methods. It is hoped that within a few years Boston University will have a field station, which will greatly facilitate the presentation of this important facet of biological training.

The Interdisciplinary Course in Experimental Biology

It has become increasingly apparent in recent years that the standard curriculum in biology can no longer provide the student with training in the multiplicity of advanced techniques and theory which are now necessary for the well-prepared teacher-scientist. Several years ago, Dr. Leland C. Wyman undertook the "modernization" of an existing course in Experimental Biology. The course is, at present, designed to

familiarize the student with the latest basic theory and practice in areas of experimentation inappropriate for inclusion in extended individual courses. To this end the course is kept rather flexible and is divided into several segments which may differ from year to year.

The course is essentially interdisciplinary. Experts in various specific areas such as biophysics, biochemistry, electronics, and animal care are asked to participate by offering laboratory practice and lecture theory in short concentrated blocks of one week or two. The work may be done either in the University or in facilities outside of the University. One hour of lecture and six hours of laboratory work are required weekly. In the past, training has been provided by various scientists in such advanced areas as the use of digital computers in the analysis of experimental data, chromatographic analytical methods, radioactive tracer techniques, methods of *in vitro* tissue culture and incubation, and micromanipulation of living tissues.

We believe that this kind of study will become increasingly important in the future as one means of filling the gaps between formal course work and research training on the one hand, and between the teacher and the researcher on the other.

Indoctrination in Animal Care

The importance of maintaining superior animal care and the significance of using known genetic strains in experimentation must be indoctrinated in our graduate students, especially those who will be teaching others. The national oversight in such matters is reflected by the lower social status and poor pay of animal caretakers, the prevalence of inadequate animal facilities, the lack of sufficient supplies of rats, mice, and hamsters for our expanding medical research programs, and the flourishing of antivivisection societies.

In September of 1961, new and adequate animal quarters were made available on the fifth floor of the Biological Science Center at the University. Included in these quarters are isolation areas, sterilization facilities, and operating room. The supervision of animal care is the responsibility of Arthur L. Kelly, D.V.M., former Director of Research at the San Diego Zoo. Dr. Kelly is experienced in the area of animal care, and he is instituting an informal apprenticeship program in this subject for doctoral candidates. Instruction will be given in procedures of vertebrate surgery and in the care of animal colonies. We an-

ticipate that this program of instruction will become a section in our interdisciplinary course in Experimental Biology.

Training in Use of Interdisciplinary Tools

The technological advances and their applications to the solution of biological problems are so rapid that special instruction for the preparation of graduate students is necessary in several areas such as electron microscopy, electronics, statistical methods, computer programming, photomicrography, and shop work. Such training can often be accomplished informally or by election of noncredit courses. For example, Applied Electronics is given by our instrument maker, Mr. John Degelman; and major professors are urged to require it for their PH.D. candidates specializing in physiology or in biophysics. Opportunities are excellent for individual instruction in photomicrography, under the direction of Mr. Frederick Maynard, our biological photographer, and in machine work as supervised by Mr. Degelman. A new electron microscope will be soon put in operation by Mr. Delbert Philpott working in Dr. Patt's laboratory. Since this microscope has been scheduled totally for research, Mr. Degelman and Mr. Philpott are planning to develop an electron microscope which may be used for teaching purposes.

Indoctrination in Newer Aspects of Quantitative Biology

In the preparation of graduate students for teaching in higher education, it is extremely important to emphasize the subject matter. Such emphasis is also being recognized as vital in the preparation of teachers for secondary schools, but it is particularly significant at the university level. The emphasis in the biological sciences is now quantitative, a fact which must be kept in the forefront in advising graduate students and in their preparation for teaching.

Because of the rapid changes in emphasis in the biological sciences, constant efforts must be maintained to preserve a balance between traditional approaches and newer curricular developments. At Boston University, we have revised our program and extended its scope preliminary to the initiation of newer aspects. For instance, we have only recently inaugurated a program in biochemistry within the Liberal Arts-Graduate School complex. The program was made possible by the establishment of a senior post for a biochemist in the Biology De-

partment with funds provided on a National Institutes of Health Training Grant in Vascular Physiology. Dr. Charles Terner was procured as Research Professor, coming to Boston University from the Worcester Foundation for Experimental Biology. He has established a research program at Boston University in intermediary metabolism of sperm and mammary tissues, and he has introduced courses in Advanced Biological Chemistry, Intermediary Metabolism, and Radiation Biology.

In an effort to expand our offering in the botanical sciences and to provide a long-needed quantitative approach, we have obtained the services of a plant physiologist, Dr. Clifford E. LaMotte, Danforth Fellow and PH.D. from Wisconsin. Dr. LaMotte will teach primarily in the General Biology Program, but it is anticipated that he will introduce a course in Plant Physiology within a year or two. Space for such a laboratory has been allocated in the new Biological Science Center. When funds become available in the near future, greenhouses will be erected on the roof of this building. It is important to try to reverse the trend whereby botany is minimized in the biological curriculum, especially in the premedically-oriented programs characteristic of many of our liberal arts colleges. We believe that a vigorous functional and biochemical approach to botany may attract graduate students who will later go into teaching and be influential in the future curricular pattern in the botanical sciences.

One of the frontiers in the biological sciences is Biochemical Genetics. When the opportunity came to procure a geneticist, we selected a man with this type of training. Research is now in progress in this specialty under the direction of Dr. Clair Folsome.

Biophysics is the new designation for a variety of complex interdisciplinary biological specialities including electron microscopy, radiation biology, bionics, theoretical and mathematical biology, neurophysiology, molecular biology, and so forth. We recognize the need for biophysical instruction and research at Boston University, and the Biology Department has allocated space for a laboratory for biophysical instruction and research in the Biological Science Center. A biophysicist, preferably with strong mathematical interests, will be procured as soon as it is feasible in order to achieve the necessary balance among the biological specialties, thus enabling us to offer superior graduate training for potential professors of biology.